BOOK REVIEW

A Monograph on the Genus Heuchera[1]

This monograph, chiefly the work of Dr. Lakela, is a culmination of previous treatments of this genus by Dr. Rosendahl, and brings to us a finished review of a most difficult group of plants, interesting especially because of its bicentric distribution in Western America and in the Appalachians. As in Dr. Pennell's admirable treatment of the Scrophulariaceae of eastern North America, this paper on *Heuchera* includes full citations of specimens (a necessity for monographic work), and we look to Dr. Rosendahl and his associates for a similar, comprehensive treatment of all the Saxifragaceae. *Heuchera* has expanded from 15 species known to Torrey and Gray in 1840 to the 51 species, many with varieties and forms included, treated in this paper. It is wholly a North American genus, most closely related to *Boykinia*, *Sullivantia*, and *Tiarella*, and more remotely to the genera centering about *Mitella*. *Boykinia*, with individually closed carpels, is the most primitive of these. As in practically all large genera, many segregations have been previously made, but only the monotypic *Conimitella* Rydberg (*H. Williamsii*), and the monotypic *Elmera* Rydberg (*H. racemosa*) are maintained. A detailed account (pp. 6–9) of the morphologic units relied upon for taxonomic differentiation: leaves, pubescence, floral characters, etc., is accompanied by a full-page illustration showing longitudinal flower-sections for each group, delineating especially the angle assumed by the hypanthium with respect to zygomorphy, and affording a better approach to identification of taxonomic sections (and therefore of species) than anything we have had in the past.

The outstanding interest in this paper, however, is the section (pp. 15–18) devoted to hybrids of *Heuchera*. Most of these are hybrids of *H. sanguinea*. At least one of the cultivated forms is a remarkable bigeneric hybrid (between *H. sanguinea* and *Tiarella*), but those of us who have vainly tried to place non-flowering plants of *Tiarella* within the genus *Heuchera* are will-

[1] A monograph on the genus Heuchera, Carl Otto Rosendahl, Frederic K. Butters and Olga Lakela. Pp. 1–180, fig. 1–5, 1936. The University of Minnesota Press, Minneapolis, $3.00.

ing to admit at least the close outward similarity of the genera, despite their actual floristic divergency. Here are records of greenhouse experiments, with actual production of hybrids between *H. Richardsonii* var. *hispidus* and *H. sanguinea* (a Mexican species), illustrated by good pictures of growing plants and flowers of parents and hybrids. *H. Richardsonii* with strongly zygomorphic, yellowish-green flowers belongs to the section *Heruchea; H. sanguinea*, in which the flowers are brilliant red and almost campanulate, belongs to *Rhodoheuchera*. The hybrids resemble large-panicled *H. Richardsonii*, but the flowers are "tubular campanulate, moderately irregular in form, and pink in color with greenish sepal-tips." Segregation of F_2 in Mendelian fashion brought out variants in height, color of flowers, and character of hypanthium. These gradually sifted out to about six strains, preponderantly like *H. Richardsonii*, and it is assumed that the *Sanguinea*-forms, being less hardy, died out first. "Just how to treat, taxonomically, such interbreeding groups is something of a puzzle. Obviously they have not quite attained to the full stature of species, as species occur in such a genus as *Carex*. They have reached a similar degree of morphological differentiation without attaining full biological independence. They are kept distinct in nature not through any biological incompatibility but merely by the accident of geographical isolation or, in a few cases, by differences in flowering periods; and these accidental barriers, whether of space or time, may at any time break down as a result of climatic changes resulting in extension of range or change in the time of flowering. In some instances this sort of thing appears actually to have happened in the not-distant past. Thus extending ranges of *H. americana* and of *H. Richardsonii* appear to have recently overlapped, and the two species are completely blended over an area of more than a hundred thousand square miles, though elsewhere they are perfectly distinct and are not even closely related. Presumably the failure of other groups to blend in a similar manner is due far more to geographical and historical than to biological causes" (p. 18).

In the accompanying map (fig. 5) these hybrids between *H. americana* and *H. Richardsonii* are seen to occur in a triangle extending from Michigan to Arkansas and Minnesota. Fitting such plants into ordinary taxonomy is accomplished by "recog-

nizing as species those entities with well-marked characters that maintain these characters over a considerable part of their range, even though they intergrade completely with some other species in certain regions, particularly where this intergradation is between forms that are obviously not closely related." These observations are bound to have an important place in all future treatments of natural hybrids.

The *Villosae* and *Micranthae* are the most primitive forms of the genus and both groups have species in the southern Appalachians. Although they represent primitive Tertiary stock, time has not been sufficient for them to spread into Asia. The *Hemsleyanae* of western United States appear to have come from certain *Micranthae*, isolated in the mountains of Mexico at an early period.

With the Western species and their subdivisions in the main taxonomic treatment (pp. 26–174), the reviewer has not had sufficient contact to pass judgment, but reduction of *H. macrorhiza* of the Alleghenies to a variety of *H. villosa* receives his whole-hearted approval.

This paper has been prepared with care, as may be seen from the geographic notes on obscure places and the cited details of Nuttall's itinerary in "Oregon" (p. 163, 164). Even the little slip-ups, which inevitably occur in a work of this scope, for example "Hort. Bldg." for "Hort. Belg." (p. 175, 176), are very infrequent; one obvious error, the lack of a specific name for *Heuchera alpestris* (p. 104) has been subsequently supplied by the authors themselves. The publication under review is not only the last word on *Heuchera* for systematic botanists, but it should be in the hands of all geneticists who are interested in the actual occurrence of hybrids in nature, and of horticulturists who contemplate growing these attractive plants.

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